

ABSTRACT

A centrifugal fluid separation system is disclosed for centrifugally separating a composite fluid into components thereof. This centrifugal separation system includes at least a centrifugal rotor which has a composite fluid containment area, several fluid flow channels and at least two separated component collection areas defined therein. A composite fluid to be separated is delivered to the fluid containment area from which it travels through an inlet channel to a substantially circumferential fluid separation channel where under centrifugal forces the composite fluid is separated into components which each then travel to distinct first and second separated fluid outlet channels, and thence on to exit therefrom into the respective collection areas. The first and second fluid outlet channels also have respective first and second heights which are related to each other so as to provide a balanced fluid pressure relationship for the respective separated component fluids flowing therethrough. Such a pressure balance controls the interface of the separated fluid components within the circumferential separation channel. The preferred fluid pressure balance relationship is $\rho_2 g_2 h_2 = \rho_3 g_3 h_3$ wherein the first height of the first outlet channel is h_2 , and the second height of the second outlet channel is h_3 , wherein g_2 and g_3 are gravitational or centrifugal acceleration values and ρ_2 and ρ_3 represent the respective densities of the separated fluids in the first and second outlet channels. A similar, continuously forward flow drive relationship involves also the height h_1 of the inlet channel and the density ρ_1 of the fluid therein such that $\rho_1 g_1 h_1 > \rho_2 g_2 h_2$ or $\rho_1 g_1 h_1 > \rho_3 g_3 h_3$. The preferred centrifugal drive motor used here produces a rotating magnetic field, which co-acts with a magnetically reactive material disposed in the rotor to rotate the rotor with the rotating magnetic field. A loopless, sealless continuous flow centrifuge is thus available herefrom. A disposable bag and tubing system is also disclosed for use with preferably reusable rotor devices.